Issued September 28, 1911.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF ANIMAL INDUSTRY.—BULLETIN 138.

A. D. MELVIN, CHIEF OF BUREAU.

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THE MILK SUPPLY

OF

CHICAGO AND WASHINGTON.

BY

GEORGE M. WHITAKER, M. A., Sc. D.,
In Charge of Market Milk Investigations, Dairy Division.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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D. OF D.
OCT 13 1911

LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Animal Industry,
Washington, D. C., April 5, 1911.

Sir: I have the honor to transmit the accompanying report on The Milk Supply of Chicago and Washington, prepared by Dr. George M. Whitaker, of the Dairy Division of this bureau, and to recommend its publication in the bureau's bulletin series.

Respectfully,

A. D. Melvin,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

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THE MILK SUPPLY OF CHICAGO AND WASHINGTON.

Part I.—THE MILK SUPPLY OF CHICAGO.

AMOUNT OF THE SUPPLY.

Exact figures as to the amount of milk consumed in Chicago are difficult to obtain because of the peculiar reticence of the railroads regarding the amount of milk transported by them. Fortunately a similar condition does not exist in other large cities. One of the best examples is Boston, where the railroads make monthly reports to the State railroad commissioners of the amounts of milk shipped into the city. These figures are then furnished by the commissioners to the newspapers and other interested parties. In Chicago none of the railroads make any such reports; some absolutely refuse information, even to an official inquirer, and some make partial or guarded statements on the pledge that no use shall be made of them except in general compilations.

But though official figures are lacking, some estimates can be made from which an approximation of the amount of milk used in Chicago can be reached. It has been estimated that the average daily per capita consumption of milk throughout the United States is 0.6 to 0.65 of a pint.[1] Applying the larger figure to 2,500,000 people gives 812,000 quarts a day. The consumption of milk according to all records available is greater in the North than in the South; hence it is fair to assume that the consumption in a northern city is above the average. It is also fair to assume that the transient hotel population of a large metropolis like Chicago would materially swell the consumption. In 526 replies to 2,000 cards mailed to physicians, lawyers, business men, and laborers in Chicago by the Dairy Division the writers reported on an average a per capita consumption in their own families of 1 pint a day. That rate carried

[1] Henry E. Alvord, Statistics of the Dairy, Bulletin 55, Bureau of Animal Industry, p. 48, 1903.

through the whole population would give as the total consumption 1,250,000 quarts. This figure is probably too large, as 800,000 is too small.

Various local authorities estimate the daily railroad receipts at between 25,000 and 30,000 cans, each holding 32 quarts. The health department in 1910[1] estimated the daily milk receipts at 31,245 32-quart cans. This would be about 1,000,000 quarts. Probably the daily consumption of milk is not far from this amount. The health commissioner estimated that 152,000 cows furnished the city's milk supply in 1908, which would make the average production 6.3 quarts per day per cow. The census of 1900 estimates the average yield of milk for each cow in Illinois at 5 quarts a day, and there is no doubt that the cows now producing milk for Chicago do better than the average for the State in 1900. His estimate for 1910 was 120,000 cows.

SOURCE OF THE SUPPLY.

Most of the milk supply of Chicago is produced within 60 miles of the city, and a 100-mile circle about the city would include nearly all of the dairies producing its supply, though in times of exceptional scarcity in the summer sweet cream is shipped 200 miles. The production of Chicago's milk within such a short distance of the city is in marked contrast with conditions in Boston and New York. Greater Boston has a population only one-third that of Chicago, but most of its milk supply is produced outside of a 50-mile circle, and some milk cars start 200 miles from the city.[2] New York City, with a million more population than Chicago, receives practically no milk from within 50 miles, and some of its supply comes from points as far away as 400 miles.

The Chicago milk supply is chiefly produced in 24 counties, of which 11 are in Illinois, 8 in Indiana, and 5 in Wisconsin (see fig. 1). Occasionally a little milk comes from Michigan. Fully three-fourths of the total supply is produced in Illinois.

Another peculiarity of the source of the supply of Chicago milk is that production has extended to the northwest much more than in other directions, and is not evenly distributed over the milk-producing territory, but is largely bunched in two counties in northern Illinois, which more than equal the combined production of the other nine milk-producing counties of that State.

McHenry County, Ill., is the third largest market milk producing county in the United States, being credited in the census of 1900

[1] Report of the Chicago Board of Health, 1907–1910, p. 317.

[2] The Milk Supply of Boston, New York, and Philadelphia, Bulletin 81, Bureau of Animal Industry. pp. 8, 41, 1905.

with sales of 29,194,198 gallons. It is excelled only by St. Lawrence and Orange Counties, N. Y., with sales of 39,795,642 and 29,617,072 gallons, respectively. Kane County is the second milk-producing county in Illinois and the fourth in the United States, with 24,244,532 gallons. The significance of these figures will be more fully appreciated when it is realized that according to the 1900 census there were only eight counties in the whole United States where the sales were in excess of 20,000,000 gallons.

That the milk supply of a city as large as Chicago is produced so near the place of consumption is somewhat remarkable, especially

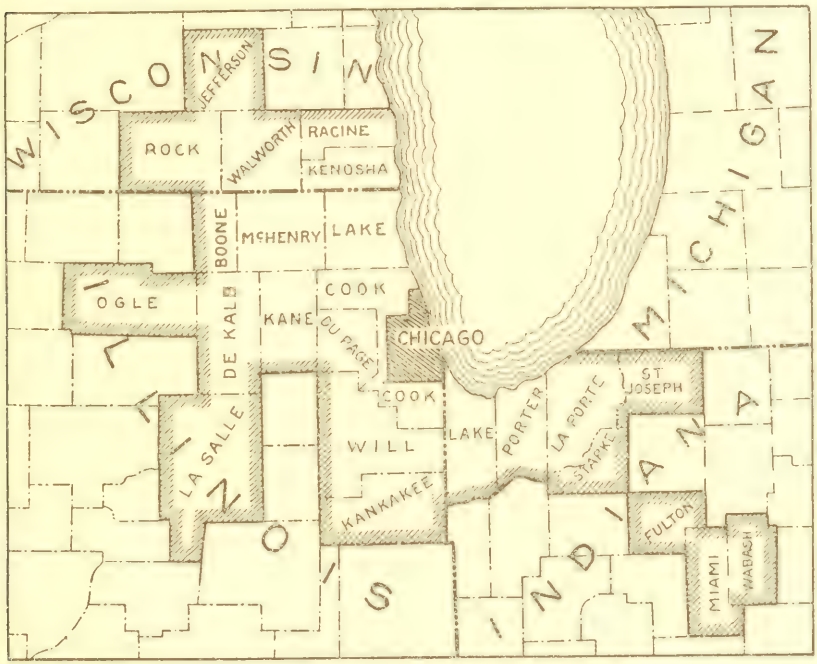

FIG. 1.—Map showing source of greater part of Chicago's milk supply.

when we remember that its lakeside location cuts off the possibility of any milk production to the east and much of the north and reduces the field of supplies to the western and southerly sections.

In spite of these conditions there is one reason for so large a production of milk comparatively near the city, namely, the fact that Chicago is not surrounded by a circle of suburban towns and cities or by large areas of land used by city people for rural residences and held at comparatively high building-lot figures. As compared with New York, Philadelphia, and Boston there is in the case of Chicago a somewhat abrupt transition from the thickly settled portion of the city to farming land. This is true to such an extent that some milk

cars take on milk within 15 miles of the city, and there are two milk-shipping stations in Cook County, where Chicago is located, which sold 14,500,000 gallons during the census year 1900. So much territory has been annexed to develop the "greater Chicago" idea that some dairying is carried on within the city limits, about 1,400 cows being kept for this purpose.

The extraordinary development of production to the northwest is largely due to the energetic pushing work of the railroads running through that section in securing shipments of milk. The possibly accidental locating in this region years ago of some dealers who have become the largest in the locality may have been another element. Land values and dominating crops may also have had an influence. Traveling southerly from Chicago, one reaches in hardly more than an hour vast stretches of level fertile land admirably adapted to dairying, but largely devoted to corn. This land is so valuable that it is considered by many farmers as more profitable for corn raising than for milk production. The assertion is frequently heard that a farmer can not afford to produce milk on such high-priced land. The extension of the milk-producing territory to the northwest has carried it into the southern tier of Wisconsin counties. More recently, however, the business has been pushed in a southeasterly direction into Indiana, and most of the increase of late years has been in that direction. There has not been much extension of milk mileage in Illinois for several years.

From 1906 to 1908 milk was rather scarce. During the winter of 1908–9 there was an oversupply, attributed in part to the number of people out of employment, in part to the cry of "trust," many persons refusing to help fill the coffers of those whom they regarded as extortionists, and in part to the talk about unclean milk due to the agitation for more rigid inspection. This oversupply continued into the early summer of 1909, when a severe and continued drought curtailed the supply and caused an uncomfortable scarcity.

During the fall and winter of 1909 and the spring of 1910 the milk supply was normal, with no excessive shortage or surplus, but the drought in July and August created a record-breaking shortage, to be followed by a comfortable ratio between supply and demand during the winter of 1910–11, which was a fairly prosperous one for the producers, one authority calling it "the most profitable period in local history."

During the fall of 1910 the increased use of condensed milk in other places proved a benefit to the producers for the local market by creating a greater demand for their product, which made considerable inroads on the market milk supply and restricted the surplus.

TRANSPORTATION AND FREIGHT.

In spite of the aversion of the railroads to stating the amount of their milk shipments, the report of the Chicago health department for 1907–1910, page 317, publishes the following:

Number of 8-gallon cans of milk delivered in Chicago by various railroads, 1898–1910.

Railroads.	1898	1899	1900	1901	1902	1903	1904
Chicago & North Western	5,400	5,400	6,000	6,500	8,500	9,000	10,000
Chicago, Milwaukee & St. Paul	2,600	2,660	3,500	4,000	5,500	5,500	6,500
Illinois Central	1,500	1,550	1,500	1,900	2,300	2,300	2,500
Chicago Great Western	1,600	1,600	1,200	1,550	1,700	1,700	1,800
Wisconsin Central	800	800	700	1,000	1,000	1,000	1,000
Chicago, Burlington & Quincy	800	800	700	900	950	1,000	1,000
Atchison, Topeka & Santa Fe	550	550	500	600	650	600	600
Grand Trunk	450	450	400	500	500	500	500
Rock Island	450	450	500	700	600	500	500
Erie	400	400	300	400	450	500	500
Wabash	350	350	300	420	400	400	400
Pennsylvania	300	350	400	550	300	300	300
Pittsburg, Cincinnati, Chicago & St. Louis	200	200			300	300	300
Monon	150	150	200	200	250	300	300
Chicago & Eastern Illinois	200	200	200	250	300	300	300
Baltimore & Ohio	250	250	200	300	300	300	300
Chicago & Alton	100	100	200	250	300	300	200
Aurora, Elgin & Chicago Electric							200
Bottled milk		1,360	3,325	1,450			
Total	16,100	17,560	20,125	24,150	24,300	24,800	27,200

Railroads.	1905	1906	1907	1908	1909	1910
Chicago & North Western	10,000	11,000	11,000	11,000	12,000	12,200
Chicago, Milwaukee & St. Paul	6,600	6,500	6,500	7,500	8,000	8,600
Illinois Central	2,600	2,600	2,600	2,600	1,865	1,775
Chicago Great Western	1,800	1,700	1,700	1,700	1,175	1,400
Wisconsin Central	1,600	1,800	1,800	1,800	940	800
Chicago, Burlington & Quincy	1,100	1,000	1,000	1,000	815	800
Atchison, Topeka & Santa Fe	600	600	600	600	500	300
Grand Trunk	550	500	500	500	520	500
Rock Island	500	500	500	500	580	600
Erie	500	500	500	500	550	620
Wabash	400	400	400	400	200	300
Pennsylvania	400	550	600	600	475	500
Pittsburg, Cincinnati, Chicago & St. Louis	400	400	400	400	200	
Monon	400	400	500	500	200	300
Chicago & Eastern Illinois	350	400	400	400	60	25
Baltimore & Ohio	300	300	300	300	425	480
Chicago & Alton	300	300	300	300	315	200
Aurora, Elgin & Chicago Electric	350	400	300	300	600	600
Cows inside city limits					500	700
Hauled by wagon					230	400
Miscellaneous					105	145
Total	28,650	29,850	30,000	30,000	30,260	31,245

From this it will be seen that the milk supply of the city comes in on about 18 different railroads, but nearly two-thirds of it comes over two lines entering from the northwestern territory previously noted. The relative amount of shipments over the different leading lines is as follows:

	Per cent.
Chicago & Northwestern	39
Chicago, Milwaukee & St. Paul	26
Illinois Central	5
Chicago Great Western	4
Wisconsin Central	2
Chicago, Burlington & Quincy	2
Others	22
	100

The milk supply has steadily increased from year to year with the growth of the city, and there has been a corresponding increase of milk shipments by the leading roads without much change in their relative standing. The roads doing the largest business have not increased their milk mileage with the larger shipments. The chief change has been in a reduction of the number of individual shippers and an increase of business from the bottling plants.

The large dealers who ship bottled milk by the carload ice it in the summer, but the supply of can milk comes in ordinary baggage cars, largely on passenger trains. It is in transit such a short time that no efforts at refrigeration are made. A single car of milk in cans may contain supplies for 50 or more dealers. A city ordinance requires this milk to come into the city in sealed cans.

FREIGHT RATES.

There is no uniformity in the system of freight rates for milk on the different railroads and no regular zone system of charges as in New York and Boston.[1] The rates of each road are independent of all others. Most of the roads issue a sheet giving a rate for each of the different shipping stations on their lines. When this is worked out on the basis of the distance of those stations from the city we get the following results on three of the roads, the price referring to a can of 32 quarts:

(1) Less than 25 miles, 12 cents; 25 to 50 miles, 15 cents; 50 to 75 miles, 20 cents.

(2) Less than 36 miles, 15 cents; 36 to 42 miles on main line and to 49 miles on branches, 16 cents; 42 to 46 miles on main line, 17 cents; 52 to 59 miles, 18 cents; 62 to 66 miles, 19 cents; 68 to 83 miles, 20 cents.

(3) Less than 10 miles, 14½ cents; 10 to 21 miles, 15 cents; 21 to 30 miles, 15½ cents; 32 to 55 miles, 16 cents; 55 to 62 miles, 17½ cents.

Stated in a general way, the matter resolves itself practically into three zones, in which the freight rate is 15, 16, and 16½ cents a can for much of the milk shipped. Sixteen cents a can is half a cent a quart, and each extra cent per can for additional distances adds three one-hundredths of a cent per quart.

As regards bottled milk in carload lots there is no official carload, but the rate is based on at least 300 crates to the car at 10 to 14½ cents a crate, or a minimum of $20 per day per car. The dealers estimate the freight to cost them on an average three-fourths of a cent per quart. The rates are the same for milk and cream. Much milk is on the road only two or three hours.

[1] Bulletin 81, Bureau of Animal Industry, pp. 11, 42.

METHODS OF HANDLING THE MILK.

Comparatively little milk is distributed in Chicago by the producers. Almost the entire product passes through the hands of middlemen. Of these there are two distinct types, employing distinct methods, and it happens that as a rule the larger dealers do business in one way and the smaller dealers in another. Hence, the line between the large and small dealers is more sharply drawn in Chicago than in most other cities, being a matter both of relative magnitude of business done and of methods employed.

METHODS OF THE LARGE DEALERS—"COUNTRY BOTTLING."

Some eight to twelve of the larger milk dealers in Chicago do about one-half the business of the city, and of these two concerns stand out preeminent, having about two-thirds of the business that is done by the larger dealers. This estimate would give one-third of the city's milk business to these two dealers. The large city dealers receive their supplies from the producers at country stations which the dealers own and operate. On account of the fact that the milk from these places is sold in bottles, filled at the stations, local usage has given the name of "bottling plants" to the milk-receiving depots, rather than "shipping stations" or "creameries," names used in other States for places having a similar use. These stations are located near a railroad and connected with it by a spur track. In the morning the farmers deliver at the station the milk of that morning and the previous evening. It is as a rule cooled by the farmers to 60° F. or below, in tanks of ice or well water, mostly the latter. It is usually delivered in 32-quart cans owned by the farmers. Every morning one will see near these milk stations long lines of farmers' wagons on the road leading to the receiving platform of the station, waiting to unload. Ordinary farm spring wagons are used, and the cans are covered with canvas.

When a farmer's cans have been emptied into the weight vat in the receiving room the cans are passed to an adjoining room where they are washed and steamed while the farmer waits. In a few minutes after delivering his load he is on his way home with clean and steamed cans. He has also received credit in the weigh room for the amount of his delivery. Milk handled at these stations is bought by the hundredweight. No milk is bought on the basis of fat percentage, though there is a minimum requirement. Usually each farmer delivers his own product at the station, but occasionally the producers cooperate in the hauling; in such cases it is customary for each one of a small group to take turns in hauling his milk and that of his neighbors to the station. Most of the producers live

within 4 miles of their stations, though in extreme cases one is found 5 to 5½ miles distant.

As soon as the milk is weighed it goes to the milk rooms, where it is mixed, cooled, and bottled. Some of these "bottling plants" filter, clarify, and pasteurize the milk as well. When bottled it is crated and the crates are iced for transportation. Some plants have a condensing outfit and do a large condensed milk business in addition to their ordinary market milk trade. Many plants have separators for obtaining cream for the cream trade, and most of them are equipped for manufacturing butter in case of a surplus of milk and also for making buttermilk. Some have a refrigerating outfit. Generally all have an abundance of steam for cleansing and sterilizing as well as for power.

Although these milk stations vary much in size and architecture, their external appearance has many common characteristics. Plate I shows one of the larger plants. On the left of the picture is shown the inclined roadway leading to the doors for receiving the milk and delivering the clean empty cans. The farmers' milk wagons reach these doors by the incline in order that the milk may be received at such an elevation that it can flow by gravity to the workrooms where it is handled. These plants are owned by large corporations with ample resources and represent a considerable investment. The owners have much capital and reputation at stake as an incentive to handling milk in a proper way. The plants are generally constructed and operated in a sanitary manner. They have thorough construction, with cement floors, tiled walls, enameled ceilings, and excellent plumbing, and are equipped with modern machinery. Plate II shows interior views of one of these plants. In one there is seen the process of bottling the milk and capping the bottles; in the other, the washing of the bottles.

One to four carloads of milk, cream, and buttermilk daily leave each of these bottling stations. They are owned by six concerns, and handle by estimation the product of from 4,000 to 4,500 producers. The number of towns from which milk is shipped in this way is approximately 50, located as shown in figure 2. McHenry County has about 20 plants. The two largest dealers have 23 establishments. Much of this milk is pasteurized in the country.

The milk cars containing this bottled milk are iced when necessary. They reach the city about midnight with the milk of that morning and the previous evening. They are switched at once to sidetracks controlled by the dealers and unloaded directly onto their platforms and transferred to the waiting wagons for the morning delivery. The two largest dealers have from 900 to 1,000 wagons each and each concern has 8 to 10 branches or divisions from which milk is distributed. The city "plants" of these dealers have almost no

General View of a High-Class Chicago Milk-Bottling Plant.

FIG. 1.—BOTTLING AND CAPPING MACHINES, AND TRACK ON WHICH BOTTLES TRAVEL IN THE CRATES. BOTTLE STERILIZER.

FIG. 2.—METHOD OF WASHING BOTTLES.

INTERIOR VIEWS OF PLANT SHOWN IN PLATE I.

facilities for handling milk, and consist chiefly of a business office, stable, and laboratory. The large dealers order from day to day, by wire, from their country plants just what milk will be needed, as

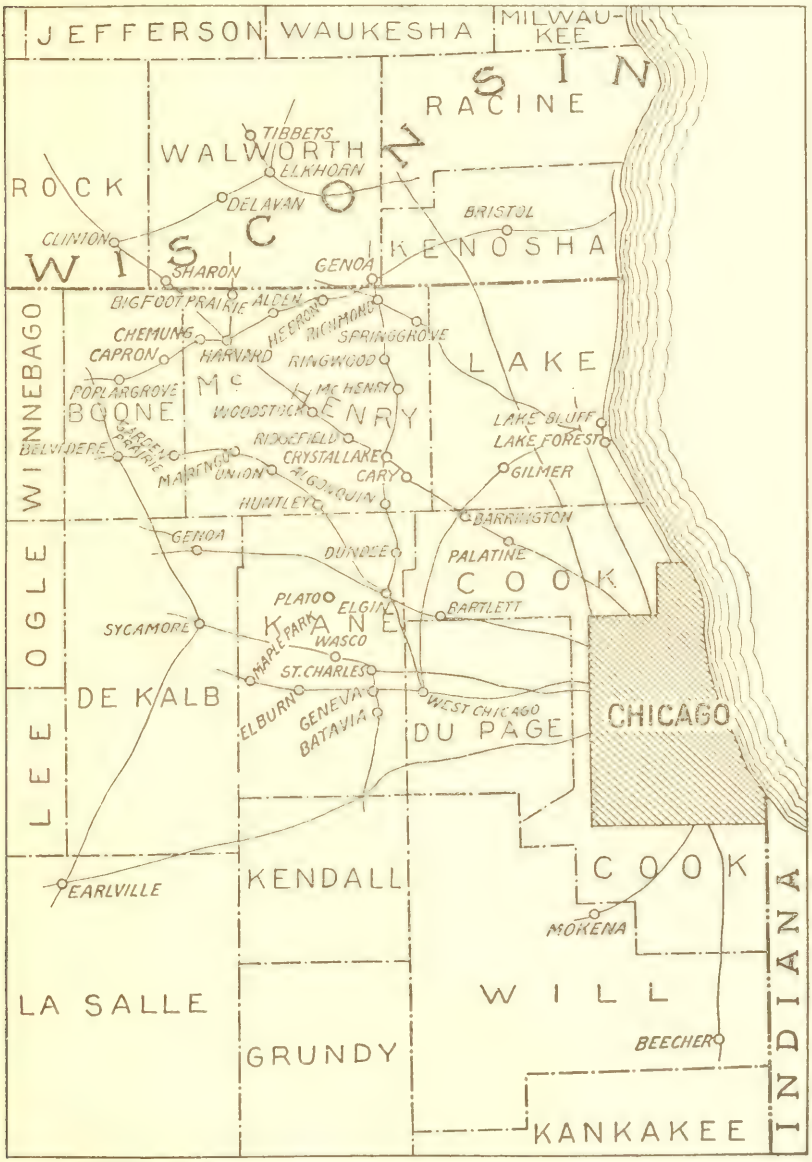

FIG. 2.—Map showing location of country milk-bottling plants supplying Chicago.

near as they can estimate. Hence, they never have more than a small, nominal surplus in the city, and need comparatively small city storage facilities.

"Milk bottled in the country" has become locally a prominent watchword for advertising purposes. The expression is used freely on wagons, in booklets, and in the newspapers, with an implied assumption of superiority. This assumption in many cases has a foundation in fact if we compare the average bottling plant with some of the ordinary city plants where can-milk is indifferently handled. It does not necessarily follow, however, that milk bottled in the country is always in all cities superior to that bottled in the city. The persistence in pushing milk "bottled in the country" is one of the local peculiarities of the Chicago milk business.

METHODS OF THE SMALL DEALERS.

The small dealers receive their milk supply in the city at the railroad platforms, of which there are from 60 to 70, and haul it to their places of business. These dealers buy of the producers, who deliver the milk at the local stations, where it is collected by the milk trains. This milk is handled in 8-gallon cans.

The large dealers buy by the hundredweight, but the small dealers by the can. The producers for the small dealers are called shippers to distinguish them from the producers who sell in the country to the bottling plants; and the shippers' product is frequently spoken of as "can" milk. The small dealers have business places of every grade of quality and condition and with a wide range of equipment. At one extreme is the very small dealer with only a pushcart and a pouring can; at the other extreme is the thoroughly up-to-date establishment, with separator, churn, and pasteurizer, and other modern machinery. Though these small plants include a wide range of conditions there is a tendency toward general improvement. One of the leading men among the small shippers, stating the case from his viewpoint, said to the writer: "Some conditions are good and some are bad, but the average is constantly improving with the general progress being made and the steady weeding out of the worst places by the city health department."

Plate III shows one of the worst places (the exterior) and also one of the worst interiors. Plate IV represents interior and exterior views of one of the better plants.

Most of the milk handled by the small dealers is retailed in bottles; a 50-can dealer is considered one doing a relatively large business. The milk cans are transported on milk cars attached to passenger trains. These cars are usually common baggage cars, with steel floors and movable shelves which can be lowered to receive more cans than will stand on the floor. Sometimes on nearing the city the milk cars are dropped from the passenger trains and made up into special milk trains. The freight is paid by the shipper on the ticket system.

FIG. 1.—A REAR BASEMENT ESTABLISHMENT. DARK AND POORLY VENTILATED.

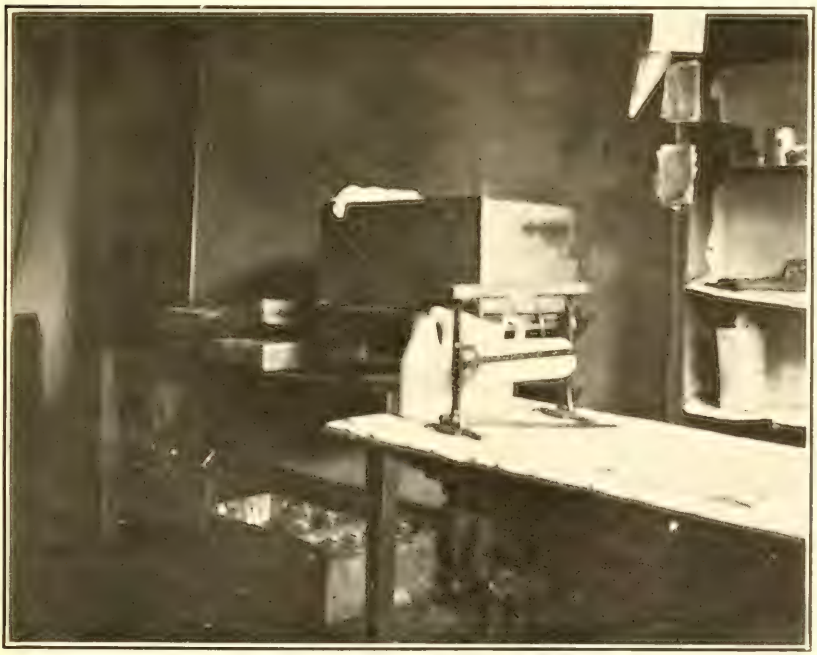

FIG. 2.—SMALL MILK PLANT IN FRONT BASEMENT ROOM. BOTTLING MACHINE NEAR END OF SHELVES. PITCHER FOR RETAILING MILK IS BESIDE WRAPPING-PAPER ROLL.

UNDESIRABLE CHICAGO MILK PLANTS.

FIG. 1.—INTERIOR ARRANGEMENT, SHOWING PASTEURIZER, BOTTLER, AND CAPPER.

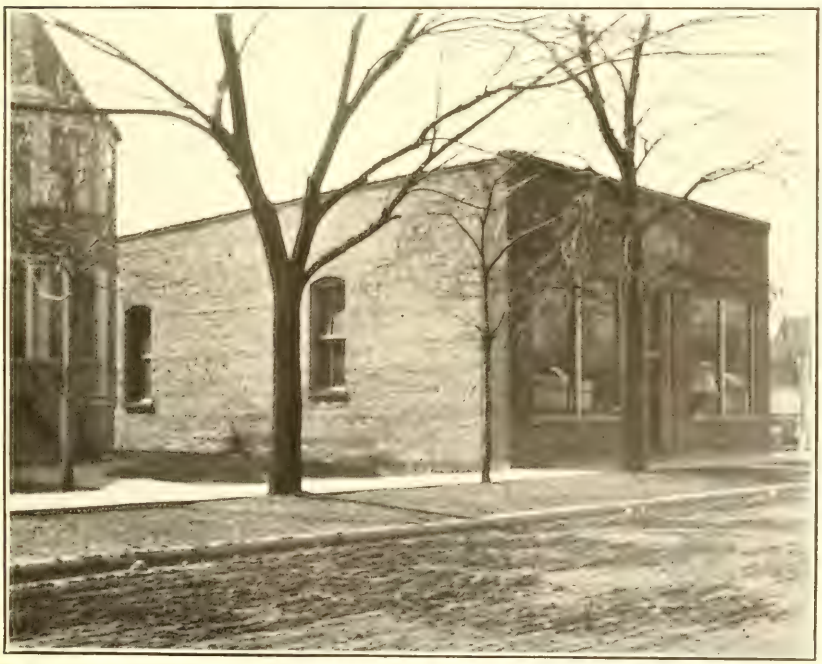

FIG. 2.—VIEW OF EXTERIOR.

CHICAGO CITY MILK PLANTS OF THE BETTER CLASS.

The number of the small dealers can not be determined from the city reports, which give only the number of licenses issued. This does not correspond with the number of dealers, for the health department issues licenses, or permits, to wagons rather than to individuals; consequently a single person may have a large number of licenses. Besides this, the number of dealers is constantly shifting, some dropping out and others coming in, so that the figures for one month would be inaccurate for another. However, by comparing various estimates and sources of information, the number of the smaller dealers is found to be approximately from 1,200 to 1,500, receiving the milk of from 5,000 to 5,500 producers.

The milk cars leave the country depots from 6 to 8 o'clock a. m. and arrive at 9 to 11 o'clock in the forenoon at platforms owned by the railroad company, some of which are covered and some are uncovered. The cars usually bring in the milk of that morning and the previous night. It is customary for the farmers to cool the milk somewhat at the farm, especially the night's milk, but nothing is done toward refrigeration in transit; therefore, as soon as the milk is received by the dealer, he at once thoroughly cools it. He then bottles it (usually in the afternoon) and stores it in ice water until time for the morning delivery. Farmers' shipments will range from one to a dozen cans each. Each shipper sends milk previously contracted for by some dealer, each can being tagged to the dealer—one tag stating the amount of the shipment. In this way the dealer readily gets at the platform the milk intended for him and can keep his accounts accurately with the producer.

There is a constant tendency among the small dealers to go out of business, saying, "There is nothing in it." This tends to concentration in the hands of the larger dealers.

HANDLING OF MILK IN STORES.

The experience of health officers in many cities has shown that grocery and provision stores and bakeries which sell milk are a menace. In the first place the proprietors of these stores frequently cut prices, sometimes selling milk at even less than the wholesale cost. These dealers use the low price of milk as an advertisement of their business, hoping to increase their sales of other articles by offering milk below cost; but such a course is demoralizing from the commercial side. In the second place, this store milk is often adulterated and is frequently handled in an extremely insanitary way—cans being uncovered in dirty places, dippers and measures extremely filthy, ice lacking, etc.

Boston has a bacteriological limit of 500,000 per cubic centimeter, and the relative percentages of the samples of milk that exceeded this number were found upon investigation by the local board of health to originate as follows:

	Per cent.
Place of production	1.5
Cars on arrival at city	12.4
Peddlers' wagons	45.6
Stores	71.5

Similar conditions existed in Chicago until recently. It was also ascertained that, as a rule, these stores were located in those districts of the city which had the highest infant mortality. Hence the common practice of dipping milk from the can in serving customers has been prohibited, and nothing but bottled milk is now allowed to be sold from stores. This regulation has been very beneficial in reducing the number of samples below grade in regard to the milk solids or food material.[1]

The number of stores in Chicago licensed to sell milk was 2,009 in 1908 as against 2,492 in 1907. In 1908, 6,732 store inspections were made and 810 stores were found insanitary; 784 of these were still bad on reinspection, and their licenses were revoked. This explains the falling off of about 500 in the number of stores selling milk in 1908. The number then increased under better conditions until it was 2,470 in 1909.

The ordinance requiring that all milk sold in stores should be bottled has resulted in great improvement in the purity of the article.

BROKERAGE.

A peculiarity of the Chicago milk business is the existence of a firm of milk brokers. This concern will undertake to find a customer for a producer who wishes to begin selling milk and will find a producer-seller for any middleman who wants to go into the business. In addition to acting in this way as a go-between for producer and dealer the brokers investigate credits and guarantee to shippers payment for their milk for a commission of 2 cents a can. This is at times important, for out of such a large number of dealers some will be dishonest and some though honest will be weak financially; hence there is an advantage in having some one to investigate the financial standing of dealers and guarantee accounts. Years ago the producers suffered heavy losses through the constant stream of dealers who failed to pay their bills. It is stated that never before in the history of the business has so little money been lost by the farmers by reason of bad credits as at the present time.

[1] Report of Chicago Health Department, Feb. 20, 1909, p. 18.

ORGANIZATIONS.

PRODUCERS' ORGANIZATIONS.

The Milk Shippers' Union is an organization of the producers who ship milk in car lots to small dealers. Different localities have local unions who elect delegates to a central union. The union elects a board of directors, one from each line of railroad represented. The Milk Shippers' Union was incorporated under the laws of Illinois, November 13, 1897. Its objects are to improve the quality of milk; to prevent the loss and destruction of cans; to secure reasonable regulations from the railroads; to protect the milk shippers against dishonest dealers; to prevent controversies on price by having it understood before the milk is delivered; to prevent monopoly by keeping an open market for any individual shipper; to exchange information on the feed, the cattle, and the care of milk. Only the best dairymen are eligible as members. The union requires milk shipped to be pure, clean, sanitary, and to contain 3.6 per cent butter fat. It discusses and estimates the market value of such milk, based on the demand, the supply, the cost of production, and the wholesale prices paid by dealers in other large cities. It states its opinion as to what the price of milk should be; but in order to avoid any trouble under antitrust laws there is no contract, rule, understanding, or obligation as to a uniform price of milk among the members. Every producer sells his own milk at his own price, but the figure named by the union is generally the price asked by its members. Usually of late the price has been fixed on such a conservative basis that the dealers have paid it without question. The union has a membership of about 600 and has been productive of much good, especially when its income is considered. It has been run on from $78 to $200 a year in addition to a small salary for a secretary. The officers are: J. P. Mason, president, Elgin, Ill.; H. B. Farmer, secretary, 54 Randolph Street, Chicago, Ill.; S. B. Woods, treasurer, Crown Point, Ind.

The Illinois State Milk Producers' Institute holds an annual meeting for educational discussion. Prominent speakers are secured and interesting and profitable meetings are held. D. D. Hunt is president; J. M. MacVean, Chicago, is secretary.

In January and February, 1909, a movement was started to bring all the milk producers into one large, general organization. The organizers hoped that by uniting the interests of the producers who ship their milk in cans with those of the producers who sell to the bottling plants much greater power would be secured. The plan was helped on by some who felt that the shippers' union had not been radical enough, and by others who wanted united effort to combat

the Chicago health rules. The plan of organization provides for a board of directors composed of one from each county having members in the association and an additional delegate from each of the five largest milk-producing counties. The directors are elected by the delegates from the local associations. The organization is called the Milk Producers' Association. The following are the officers: President, E. J. Fellows, St. Charles, Ill.; secretary, James P. Grier, Chicago, Ill.; treasurer, J. F. Martin, Antioch, Ill.

DEALERS' ORGANIZATIONS.

The 10 or 12 larger dealers have an organization called the Illinois Milk Dealers' Association.

The smaller dealers have an organization called the Chicago Milk Dealers' Association. This is subdivided into four local associations, one in each of the four main geographical sections of the city. At their meetings matters of mutual interest are discussed. Each local association elects four delegates to the central body. The latter considers the broader questions and employs an attorney and a business agent. The attorney looks after the interests of the members in courts, appears before committees of the city government to state the opinions of the milk trade on pending legislation, and does such other things as may be required from time to time. From one-half to three-fourths of the small dealers are in this association.

THE MILK DRIVERS' UNION.

The drivers of milk wagons are well organized, and this union has had much influence on the business as well as on wages. It has regulated the hours of work, by which all milk must be delivered before 1 o'clock p. m. in the summer. In the winter the drivers will not begin work before 8 o'clock a. m. Sunday hours of delivery are also regulated. A team will deliver from 200 to 300 quarts a day. There are about 1,700 members in the drivers' union.

WHOLESALE AND RETAIL PRICES.

The following tables give the wholesale prices paid by the milk dealers for a number of years. In the first table is given the can price as explained on page 16 delivered on the Chicago platform, the producer paying the freight out of this figure. The second table gives the price per 100 pounds paid at the large country plants by the bottlers:

Price paid per 8-gallon can for milk delivered in Chicago, 1896–1911.

Months.	1896	1897	1898	1899	1900	1901	1902	1903
January	$0.80	$0.90	$0.80	$1.00	$1.00	$1.10	$1.10	$1.15
February	.80	.90	.75	.80	1.00	1.10	1.10	1.15
March	.75	.75	.70	.80	.90	.95	1.00	1.10
April	.70	.70	.70	.80	.90	.90	.95	1.05
May	.60	.65	.65	.65	.75	.75	.75	.80
June	.60	.65	.65	.65	.75	.75	.75	.80
July	.65	.75	.70	.75	.85	.85	.85	.90
August	.65	.75	.75	.85	.85	.90	.90	1.00
September	.70	.75	.85	.90	.95	.95	.95	1.00
October	.70	.80	.85	.90	.95	.95	.95	1.00
November	.85	.85	1.00	1.15	1.15	1.15	1.15	1.15
December	.87	.80	1.00	1.10	1.15	1.15	1.15	1.15

Months.	1904	1905	1906	1907	1908	1909	1910	1911
January	$1.15	$1.15	$1.10	$1.20	$1.45	$1.30	$1.30	$1.55
February	1.15	1.10	1.10	1.15	1.45	1.30	1.35	1.50
March	1.15	1.10	1.05	1.10	1.30	1.25	1.30	1.45
April	1.05	1.00	1.05	1.10	1.25	1.25	1.30	1.40
May	.75	.80	.80	.90	.95	1.00	1.00	1.40
June	.75	.80	.80	.85	.90	.90	1.00	.95
July	.85	.85	.90	1.00	1.00	1.00	1.10	1.05
August	.85	.85	.90	1.05	1.10	1.10	1.15	1.20
September	.95	.95	1.00	1.10	1.10	1.15	1.25	1.25
October	.95	.95	1.00	1.10	1.15	1.15	1.25	1.25
November	1.15	1.15	1.20	1.45	1.35	1.45	1.60	.....
December	1.15	1.15	1.20	1.35	1.35	1.45	1.60	.....

Price paid per 100 pounds for milk delivered at bottling establishments in the country.

Months.	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911
January	$1.35	$1.45	$1.45	$1.55	$1.50	$1.45	$1.55	$1.65	$1.55	$1.75	$2.00
February	1.35	1.40	1.45	1.55	1.40	1.40	1.45	1.65	1.55	1.70	1.90
March	1.30	1.30	1.35	1.30	1.30	1.30	1.35	1.55	1.45	1.55	1.70
April	1.05	1.15	1.20	1.20	1.20	1.20	1.30	1.35	1.40	1.45	1.30
May	.85	.90	.95	.90	.90	.90	1.00	1.05	1.10	1.20	1.10
June	.85	.80	.85	.80	.80	.80	.90	.95	.95	1.05	1.10
July	.80	.90	.95	.90	.90	.90	1.00	1.05	1.05	1.20	1.30
August	1.05	1.05	1.10	1.10	1.05	1.10	1.20	1.25	1.25	1.30	1.45
September	1.15	1.15	1.20	1.20	1.15	1.20	1.30	1.35	1.35	1.40	1.45
October	1.30	1.35	1.35	1.30	1.30	1.35	1.55	1.45	1.55	1.70	.....
November	1.40	1.45	1.45	1.40	1.40	1.45	1.65	1.55	1.70	1.90	.....
December	1.45	1.45	1.55	1.50	1.45	1.55	1.65	1.55	1.75	2.00	.....

The bottlers contract for milk for six-months' periods in April and October; the shippers fix their prices in May and November.

Figure 3 gives a graphic view of the prices paid beginning with 1903 by the two systems, reduced to the quart as a unit. The upper line represents the shippers' price and the lower line the bottling-plant price. In the former case the farmer pays the freight, which averages half a cent a quart (see p. 12). The dotted line shows the net return to the farmer who ships can milk to Chicago. Figure 4 shows the maximum and minimum prices for each year since 1896.

The prevailing retail price in the autumn of 1907 was 7 cents a quart, and had been for some time. An attempt to raise the price to 8 cents was made in the winter of 1907–8. This was followed by

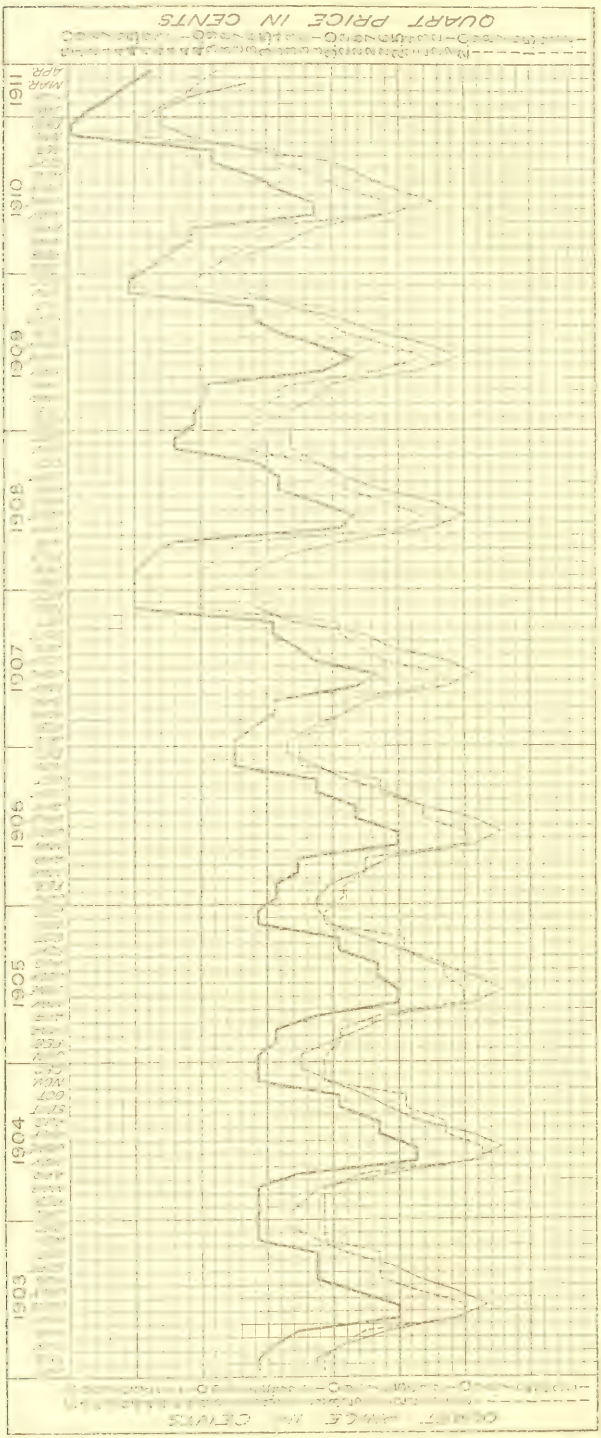

Fig. 3.—Monthly range of wholesale milk prices at Chicago.

cries of "trust" in some of the newspapers and 13 grand-jury indictments. It was charged—

That defendants were engaged in a conspiracy to crush out competition; that defendants conspired to form a pool; that defendants conspired to commit an illegal act against the public administration of justice; that the conspiracy was not only to control prices charged to consumers, but to regulate prices paid to producers.

The bill of particulars filed by the Commonwealth alleged—

That defendants advanced the price of milk to consumers 1 cent per quart in the fall of 1907 almost simultaneously.

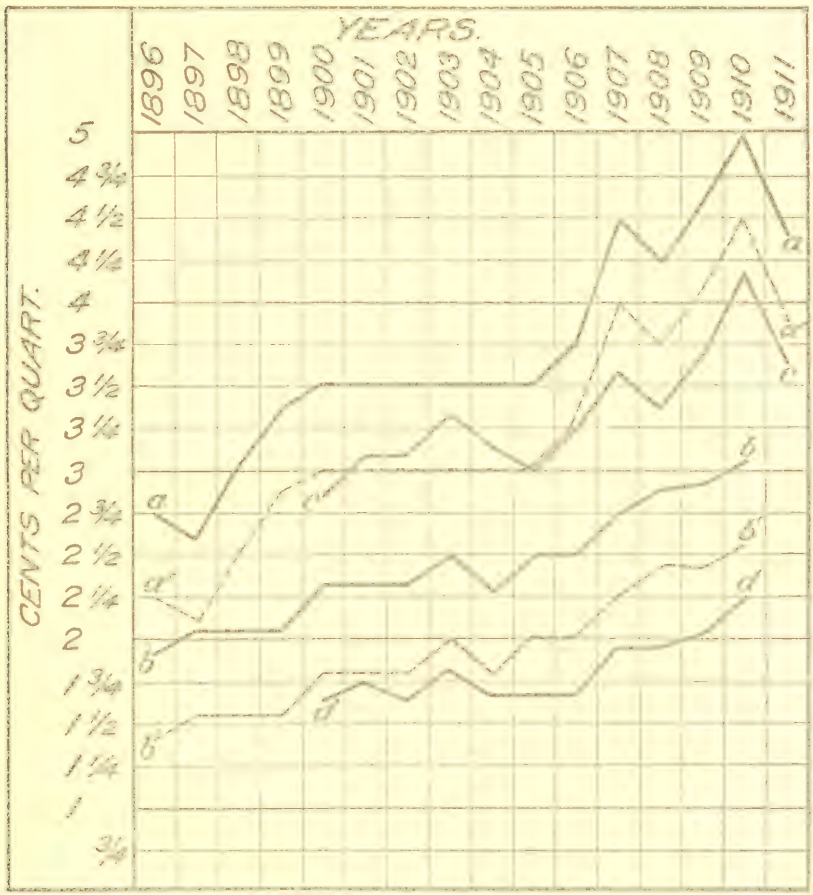

FIG. 4.—Summer and winter wholesale milk prices at Chicago. *a*, Price of can milk in November and December; *a'*, same less freight; *b*, price of can milk in May and June; *b'*, same less freight; *c*, winter price of milk at country bottling plants; *d*, summer price at bottling plants.

That customers received notice from defendants about the same time regarding the increase in milk prices.

That defendants increased the price given to farmers in order to drive out competition in the dairy-produce country.

As a result of this agitation the retail price was dropped to 7 cents and remained at that price during the winter of 1908–9. When the

case was reached on the court calendar it was dismissed by the judge without trial.

In the winter of 1909–10 an effort was again made to raise the price to 8 cents, but much milk was sold at 7 cents, and daily newspaper agitation finally reduced the price to 7 cents.

THE OFFICIAL INSPECTION.

Milk inspection in Chicago is under the general supervision and direction of the health commissioner and is directly in the division of food inspection. This division has a chief, and also a chief of dairy inspection. Under the latter there are at present 10 milk inspectors for city work and 10 dairy inspectors for country service. The salaries of these 21 officers aggregate $22,500. The health department has a laboratory with 3 bacteriologists and 6 chemists for general work, and in addition 2 officers specially designated as milk testers. These latter are paid $2,400, increasing the direct expense for milk inspection to $24,900, no account being taken of other office and supervisory expenses, which might properly be chargeable to milk inspection.

The milk ordinance now in force was adopted early in 1908, and the score-card system of inspection was soon after inaugurated. There are used one form of score card for dairy farms, substantially like that of the Dairy Division, Bureau of Animal Industry, United States Department of Agriculture, another form for city milk depots, and a third for stores selling milk. The health department has also devised a form of score card for the inspection of bottling plants.

In addition to the official inspection, the largest bottlers have regulations looking to clean, pure milk, and employ their own inspectors to see that these regulations are complied with.

A question has been raised, growing out of the increased activity of the health office, as to the legal rights of city inspectors when making investigations outside of the municipal limits, an eminent authority having said that these inspectors—

> have no more authority upon your farm or mine than the burglar that seeks to break into our house at night.

On the other hand, the ordinance says that—

> Milk produced on farms * * * where the rules of the department are violated shall be declared unclean, unwholesome, and infected. The sale of or offering for sale of such milk is prohibited. All unclean, unwholesome, or infected milk shall be condemned for human food.

Such milk is to be returned to the shipper, and on a second offense is to be so denatured that it can not be used as food. Hence, without raising technical or academic points, it will be seen that the producer will save himself annoyance and inconvenience by allowing an inspection of his premises.

The milk laws in effect in the city are for the most part municipal ordinances. Where the health officer or other interested party desires a new law or the modification of an old one, he goes to the city council rather than to the legislature. The present Chicago ordinances are very specific as to all details of production and handling. The sale of milk over 70° F. or containing over 3,000,000 bacteria per cubic centimeter is prohibited.

In July, 1908, the city council passed an ordinance which provided that all milk sold in the city should be from cows that had satisfactorily passed the tuberculin test; but, realizing the difficulty of putting such an ordinance into immediate effect, the ordinance allowed pasteurization as an alternative for five years. The theory upon which the ordinance was passed was that five years would be required to test the cows and exclude the tuberculous, there being about 125,000 cows producing milk for the Chicago market, owned by some 12,000 farmers. When the ordinance was passed it was to take effect January 1, 1909, but bitter opposition developed and it has been fought with persistency for several years. The time for its going into effect has been postponed from time to time, until finally it became effective January 1, 1911. After that date no license has been issued to any dealer unless his supply was properly pasteurized or obtained from a dairy the cows of which had been properly tuberculin tested within one year.

Growing out of this agitation, a city commission was appointed to investigate conditions and a State commission was appointed to make an investigation as to the accuracy of the tuberculin test. The first commission has made a preliminary report critical of the city milk supply, and the State commission has reported to the legislature a recommendation to the effect that municipalities should not have the right to enact tuberculin testing ordinances.

Meanwhile the work of testing cows progressed. Animals were tested with tuberculin as follows: In 1908, 10,860; 1909, 29,499; 1910, 6,302. But the recent session of the legislature enacted the following: "It shall be unlawful for any city, village, incorporated town, county, or other corporate authority in the State of Illinois by ordinance, rule, or regulation other than may be established by the law of this State to demand, fix, establish, or require the tuberculin test to be applied to dairy animals as a means or measure of regulating and purifying milk, skimmed milk, cream, and dairy products of said animals in any manner whatever, and every such ordinance, rule, by-law, or regulation heretofore or hereafter passed, demanded, fixed, established, or required by any such city, village, incorporated town, county, or other corporate authority other than the State of Illinois is hereby declared to be void and of no effect."

The number of pasteurizers installed in the city is 210 and in the country 100—310 in all. Most of these have been put in during the past two years.

The inspection of the work of pasteurization devolves upon the health department. The number of tests made in 1909 was 3,914; in 1910, 5,203. The tests show good results from the standpoint of reduction of the bacteria, but are nevertheless unsatisfactory and show much poor work done by the pasteurizers, which the department is laboring to overcome. The average bacteria count from August 1 to December 31, 1909, was 944,000 per cubic centimeter, and 2,219 of the 1910 samples averaged 1,702,000. The average of the city's raw milk for 1910 was 11,574,000 and during the summer months it was 13,932,000.

During the seven weeks ending the middle of September, 1909, the inspectors of the health department took 829 samples of milk for bacteriological examination, with the following results:

Results of bacteriological examination of 829 samples of milk in Chicago.

Bacteria per cubic centimeter.	Pasteurized.		Raw.	
	Number.	Per cent.	Number.	Per cent.
Less than 1,000	2	0.76	.....	.....
1,000 to 10,000	8	3.04	.....	.....
10,000 to 100,000	94	35.90	14	2.47
100,000 to 500,000	80	30.52	57	10.04
500,000 to 1,000,000	31	11.80	45	7.93
1,000,000 to 5,000,000	34	13.00	227	40.03
5,000,000 to 10,000,000	5	2.00	106	18.70
10,000,000 to 20,000,000	7	2.00	81	14.30
Over 20,000,000	1	.38	37	6.53
Total	262	100.00	567	100.00

All of the samples of unpasteurized milk averaged 5,547,502 bacteria per cubic centimeter; the pasteurized milk averaged 944,465.

One section of the ordinance requires that drivers' seats on milk wagons shall be divided from the compartment where the milk and cream are kept. Milk for delivery in bulk must be carried in covered pouring cans provided with a spout or faucet. It must not be dipped from carrier cans for delivery to consumers. All milk shipped into Chicago must be sealed. The last rule, in the estimation of the health officer, has almost entirely stopped the watering of milk. Sealing the cans has a tendency to fix the responsibility for adulteration, and therefore makes conviction and punishment more certain, which has had a decidedly deterrent influence.

An average of 1,230 samples are taken each week. It is expected that, as a rule, a dairy-farm inspector will make 40 inspections per week, and that the city inspector will make 30 inspections with the necessary reinspections and take 100 samples. The following shows in detail the work of inspection:

	1907	1908	1909	1910
Samples of milk taken in the city for chemical analysis	60,688	63,984	41,853	34,739
Per cent below grade	7.4	4.8	4.2	3.5
Cases in court	1,473	2,089	1,312	1,201
Fines imposed	$667	$7,880	$1,305	$920
City inspections of stores and milk depots	6,638	16,855	16,566	15,808
Cases in court	47	352	1,442	925
Fines imposed	$282	$2,112	$5,816	$4,756
Inspections of dairy farms	7,374	9,865	10,211	5,221
Farms whose supply was excluded from the city	468	350	.....	262

The falling off in samples taken for chemical analysis is due to the increasing attention given to bacteriological tests and is offset by the increased number of such examinations. Increasing attention has been given during the past few months to filtering samples of a pint each through a small disk of cotton. These are preserved with the name of the dairy from which they were obtained and, if bad, used as a lever to secure better conditions.

EXISTING CONDITIONS.

In discussing the quality of an inspection system which has to oversee 12,000 milk producers and 1,500 city milk dealers with 2,600 wagons and 2,400 stores, with only 20 inspectors, much will depend on the viewpoint and temperament of the critic. He will find much to commend and much to criticize, and criticism of conditions may not imply criticism of the inspection service or the faithfulness and efficiency of its work. Such a tremendous job can not be perfect in results, and there will necessarily be various grades of efficiency where many inspectors are employed.

As a result of some investigations made in 1905–6 by Prof. J. M. Trueman, of the Illinois Agricultural Experiment Station,[1] he reported that—

> The absence of preservatives was plainly noticeable in Chicago milk; that of 413 samples of milk taken in the summer of 1906, 134, or 32 per cent, were below the standard (3 per cent of fat); 21 of these, however, had 2.8 and 2.9 per cent of fat, and were so near the line as not to be cases for prosecution. It was an exception to find a milk depot that was clean and sanitary. A great many of the markets are located in dark, dirty, and ill-ventilated basements where the sunlight never enters. They are never scrubbed, and many of them could not be because the floors are rotten wood or only of earth. Occasionally one of these small depots is found scrupulously clean.

Conditions have improved since that time, as has been shown on previous pages, with a new law, new energy, and more inspectors; and evidence is abundant that steady progress is being made, though much remains to be done, and Dr. W. A. Evans, health commissioner, himself said, in March, 1910: "Chicago's milk supply is one of the dirtiest in the world."

[1] Bulletin 120, Illinois Agricultural Experiment Station.

The writer of this bulletin spent a part of November and December, 1909, in some investigations, working a few days with each of the inspectors and seeing a little of each milk-producing section. In every place visited the Chicago inspector and the writer visited every dairy they came to so far as the time would allow, so that there was no selecting of dairies, and each inspector asserted that a fair average of the conditions was seen. Speaking in a general way, conditions were bad, but everywhere there were evidences of improvement. Stating the results of the investigations in mathematical terms, resulting from the rating given on the score cards, 100 being perfect, there were found:

In the twenties, 11.7 per cent of the places visited.
In the thirties, 35 per cent of the places visited.
In the forties, 43 per cent of the places visited.
In the fifties, 9 per cent of the places visited.
In the sixties, 1.3 per cent of the places visited.

The average was 40.06.

Seventy-three per cent were rated nothing for cleanliness of the stable yard; 59 per cent were given a score of nothing for light; and a score of nothing for ventilation was given to 42 per cent.

In the majority of cases cows were allowed to calve in the stanchions. The milk room in most of the dairies was simply a tank room where the milk is cooled. In many cases this was badly located, being at the corner of the barnyard or a hog yard or both. In practically every case the milk utensils were washed in the kitchen of the house. No cooler was found in any instance, milk being cooled by being set in a tank of well water. Not a single narrow-top milk pail was found in use, or a single instance where milking suits were used. Eighteen per cent of the cows were given a score of nothing for cleanliness. Forty-six per cent of the dairies inspected were scored nothing for cleanliness of the stable air at the time of milking. A score of nothing for cleanliness of milk house was given in 41 per cent of the places visited. Eleven per cent of the dairies received a score of nothing for care and cleanliness of utensils.

The external appearance of the barns in the milk-producing territory is much better than in some other sections of the United States. A large proportion of them are in good repair and well ventilated, but many appear to be deficient in light.

The department of health a few years ago waged a vigorous contest against the feeding of wet malt to dairy cows. Powerful interests attacked this ordinance, but the appellate court of Cook County affirmed the validity of the ordinance October 8, 1906. The court said that power to enact ordinances for the preservation of the public health is inherent in a municipality, and quoted an opinion of the Supreme Court of Minnesota (66 Minn., 166), which said that—

Any public regulations that did not provide means for insuring the wholesomeness of milk * * * for sale and consumption would furnish very inadequate protection to the lives and health of its citizens. * * * The presumptions of the law are in favor of the reasonableness of the ordinance. * * * It is therefore incumbent upon anyone who seeks to have it set aside as unreasonable to point out or show affirmatively wherein such unreasonableness consists.

INFANT MORTALITY.

The health commissioner reported in February, 1909:

The infant death rate of the last few weeks shows a material improvement. This may be due to an improvement in general sociologic conditions. Possibly life is not quite so hard as it was a year ago. Nothing responds so accurately to the financial conditions of the poorer people as does infant mortality. And possibly also all of this agitation for a better milk supply is showing in an improved baby death rate, as it has been shown in the statistics of chemical and bacteriological examinations of the milk division.

In his annual report for 1909, published in January, 1910, Commissioner Evans said:

A most noteworthy development of the year has been the pronounced reductions in deaths among milk-fed babies—in spite of an unusually hot summer. It is believed that a purer milk supply has contributed most in this reduction. With 60 per cent of the city's supply now pasteurized, and with regulations for the sanitary handling of milk more universally enforced than ever before, our babies' milk has, within the last year, become a much safer and better article of food. Under ordinary conditions it is a certainty that greater reductions would have been recorded. As it stands there were 641 fewer baby deaths as compared with 1908, a reduction that is not only gratifying but is regarded as hopeful for much better things in the future.

The following table shows the decrease in infant mortality between the ages of 1 to 5 years for four decades:

Decade.	To 1,000 population.	Per cent of total mortality.
1871–1880	4.69	22.84
1881–1890	3.85	18.67
1891–1900	2.60	14.20
1901–1910	1.42	9.69

THE PRODUCTION OF HIGH-GRADE MILK.

Milk of high grade is produced by a number of dairies and sold at several cents a quart above the price of ordinary milk. A few dairies have sold for several years what they called certified milk, but the term in its strict sense has been a misnomer. The expression "certified milk" is correctly used only when the milk has been produced under conditions prescribed by a committee of some regular medical

association and when this committee certifies that its rules or recommendations have been complied with.[1]

Usage has given the name of "commission" to these committees. The earliest commission of a medical society in the field was the Essex County Milk Commission of Newark, N. J., which copyrighted the term "certified milk," but offered it for use by any medical milk commission organized to influence dairy work for clinical purposes. The use of the word "commission" as applied to the milk committee of a medical society is liable at times to give rise to confusion, as was the case in Chicago for some time. This city had no milk commission, in the sense mentioned above, until recently, and hence no body which could certify milk, though large amounts of so-called certified milk were sold. To increase the confusion, an organization adopted the name of "milk commission," to "distribute pasteurized and modified milk among sick children of the poorer parts of Chicago at prices far below cost." This philanthropic body did not exist for the purposes of certifying to the satisfactory production of milk, and only a minority of its officers were physicians. However, it did most excellent work in its way. For instance, in January, 1909, it distributed 59,360 bottles of milk from its own laboratory and from 21 other stations. This was an increase of 12,545 bottles over the amount distributed during the corresponding month of the previous year.

A regular medical milk commission for certifying milk was appointed by the Chicago Medical Society early in 1909 and is now certifying to the milk produced by seven dairies. The certified milk is sold for the most part by regular dealers, who also handle the common market milk. Dr. J. W. Van Derslice is president and Dr. Julia D. Merrill is secretary of this commission.

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[1] Certified milk in the strict sense of the term is milk produced under a legal contract between a medical milk commission and a dairy and which conforms to its requirements.—C. B. Lane, U. S. Dept. of Agriculture, Bureau of Animal Industry Bulletin 104, p. 9.

"Certified milk" is a term * * * coined by the writer and first used in connection with a plan brought to the attention of physicians * * * in 1893. * * * It provided for a commission of medical men who should by voluntary supervision, paid expert inspection, and final certification, endeavor to influence a supply of milk produced under regulations imposed by themselves.—Henry L. Coit, M. D., Kentucky State Medical Journal, May, 1908.

No person shall sell or exchange or offer or expose for sale or exchange as and for certified milk any milk which does not conform to the regulations prescribed by and bear the certification of a milk commission appointed by a county medical society, organized under and chartered by the Medical Society of the State of New York, and which has not been pronounced by such authority to be free from antiseptics, added preservatives, and pathogenic bacteria or bacteria in excessive numbers.—New York Laws, sec. 22, amended April 30, 1907.

Part II. THE MILK SUPPLY OF WASHINGTON.

AMOUNT AND SOURCE OF THE SUPPLY.

The District of Columbia consumes about 76,000 quarts (19,000 gallons) of milk a day, or about 0.4 of a pint per capita. This is produced on 1,091 dairy farms, from 17,688 cows. A few years ago when the number was 16,272, they were located as follows:

	Cows.
District of Columbia [1]	734
Maryland	8,448
Virginia	6,428
Pennsylvania	137
New York	525
Total	16,272

The District is surrounded on all sides by good farming country, and if dairying were intensively developed the entire milk supply could be easily produced within wagon haul of the District. As it is, about one-third is brought in by wagons and two-thirds by steam and electric railroads. Of the milk brought into the District by the latter conveyances 59 per cent comes by the Baltimore & Ohio Railroad, 30 per cent by the Southern lines, and 11 per cent by electric lines. Most of the supply is produced within 55 miles of the city. The bulk of it comes from Loudoun and Fairfax Counties, Va., and Montgomery and Frederick Counties, Md. (See fig. 5.)

The near-by supply of cream is insufficient, and considerable quantities are received regularly from Philadelphia and New York. The dealer can, in an unforeseen emergency, telegraph to some city depot or country creamery at these places and receive a supply within a few hours.

TRANSPORTATION AND FREIGHT.

The Baltimore & Ohio Railroad delivers from 6,000 to 6,500 gallons daily. It has about 20 milk stations, mostly on the Metropolitan Branch, the most distant shipping point being 57 miles away. The largest amounts are shipped from Germantown, Boyds, and Frederick, all in Maryland.

[1] The total number of cows in the District, including the cows kept by public institutions and by individuals owning only one cow for family use, is 1,762.

The Southern Railway transports about 3,300 gallons daily. This road has 38 shipping stations on the main line and two branches, the most remote point of taking milk being 92 miles distant from the city. The largest shipping points in its territory are Herndon and Purcellville, in Virginia.

The milk is brought to the stations by the farmers in their own cans and is shipped in baggage cars attached to the passenger trains. Plate V, figure 1, shows a common morning scene at one of these

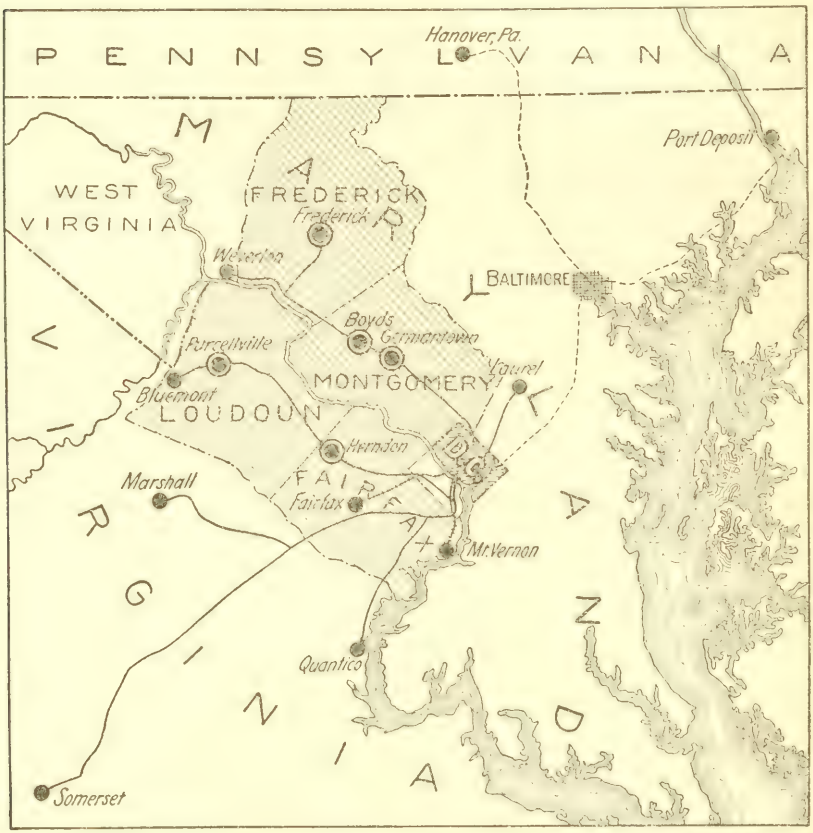

FIG. 5.—Map showing source of most of Washington's milk supply. Heavy dots indicate points from which milk cars start. Five largest shipping points are shown by dots inclosed by circles.

railroad stations. The farmers have unloaded the milk from their wagons to the platform before the arrival of the train, and while the train waits they rush the cans into the car. This picture is, in fact, characteristic of market-milk production in many other parts of the country, similar conditions and scenes being found in every State where milk is produced for and shipped to a city market.

In the construction of the new Union Station at Washington provision was made for the convenient and prompt handling of milk by a siding and platform 600 feet long at the rear of the station, to

FIG. 1.—LOADING A MILK CAR BEFORE SUNRISE IN VIRGINIA.

FIG. 2.—UNLOADING MILK FROM AN ELECTRIC CAR IN A WASHINGTON STREET.

HANDLING MILK FOR WASHINGTON.

FIG. 1.—SCENE AT MILK PLATFORM AT OLD BALTIMORE & OHIO STATION.

FIG. 2.—MILK PLATFORM AT NEW UNION STATION.

UNLOADING MILK AT RAILROAD STATIONS IN WASHINGTON.

which the cars can be quickly shifted on arrival. (Pl. VI, fig. 2.) The cars are for the most part due to arrive between 8 and 9.30 o'clock a. m., although, on account of the lack of refrigeration, afternoon shipments are sometimes made in summer.

Electric railroads are utilized for milk shipments into Washington more than in many places of this size, and one road brings in milk by the carload. (Pl. V, fig. 2.)

FREIGHT RATES.

Most of the milk shipments are in 40-quart cans, though some twenties and thirties are used. The freight rate on the steam roads is from 2 to 3 cents a gallon, according to distance. Most of the milk comes from the 2½-cent zone, making the average freight a little over half a cent (0.6 cent) a quart. On the electric roads the rate ranges from one-half cent to 1½ cents a gallon. The custom prevails of making the same charge for cream as for milk. Freight is paid by tickets attached to the cans.

THE PRODUCERS.

The 1,091 farmers who produce milk for the District of Columbia have herds averaging about 16 cows in each. Only 32 exceed 50 cows, and only 4 farmers have herds exceeding 100 cows each. On the other hand, 230 farmers have 10 cows or less. The great majority of the herds number from 10 to 30 cows each. The tendency, however, is to increase the size of the herds. The statistics show that there is a decreasing number of producers, while the growing needs of the city call for the product from an increasing number of cows.

Conditions attending the production of milk are improving. The District health department, although hampered by limitations which will be referred to later, has done commendable work in eliminating some of the worst features connected with the production of the local milk supply. In 1906–7, 241 cows were condemned as unfit for milk production, and in 1908–9, 220 were condemned. The farms supplying the milk were scored by the Dairy Division in 1906–7, the average score being 43.44, and 300 scored in the thirties or below, the latter scores indicating conditions which would warrant excluding the product of such dairies from the market. Ventilation was the condition which scored lowest; next to the lowest was removal of manure; and next, light. Other noticeably bad conditions related to cooling the milk, cleanliness of milking, cleanliness of stable yard, and construction of stable. Marked improvement has been made since then, but Dr. W. C. Woodward, the District health officer, says:

> The improvement seems slow. The public, however, which has been for many years so tolerant of insanitary conditions on the dairy farm, must realize that existing

conditions are due to its own ignorance and neglect quite as much as to the ignorance and neglect of the farmer.

Sixty-two dairymen, keeping 734 cows, reside within the District limits and retail their product without the intervention of middlemen.[1] Milk is also brought into the District by wagons from about 25 villages, 18 miles being the longest haul. Much of this wagon milk is retailed by the producer, though a considerable proportion of it is taken to the city milk plants and handled the same as railroad milk.

METHODS OF HANDLING MILK IN THE CITY.

The District of Columbia has about 79 middlemen who have regular milk plants. This is a larger number than is usual in places of this size. By a localism these dealers are called "dairymen" and their plants are called "dairies." The latter include a wide range of conditions, from the establishment in the rear basement of some dwelling with meager light and air to the up-to-date place with a full equipment of modern machinery. (See Pls. VII and VIII.) The dealers do a business ranging from 50 to 2,000 gallons a day. An unusually large proportion of the milk business of the city is done by small dealers, and there is less of a tendency to concentration than is noticeable in some other places. Although 4 per cent of the dealers do one fourth of the entire business, the smallest dealers (69 per cent of the whole) do another fourth. Between these there are 9 per cent that do a fourth, and the remaining 18 per cent another fourth of the business. In other words, 13 per cent (the larger dealers) do one half the business, and the smaller dealers (87 per cent of all) do the other half.

Some of the small plants are open to criticism from the sanitary standpoint, a prominent fault being the intermingling of domestic and business life on account of the small business done. Yet all are constantly improving, and the good work of the health department is noticeable on every hand. All milk rooms are required to have clean cement floors, tidy, well-whitewashed walls, and good drainage, being connected with city sewers. Four per cent of the dealers score 90 or above; 16 per cent score 80 or above; 49 per cent score 70 or above; 25 per cent score 60 or above; 6 per cent score 50 or above.

Milk on reaching the dealers' plants has in the great majority of cases been from four to seven hours in transit, frequently without any refrigeration. It is usually cooled to some extent on the farm. It reaches the city plants between 10 and 12 o'clock a. m., and is cooled at once. In most cases this is done by placing the cans in tanks of ice water. Some of these tanks are primitive wooden boxes

[1] The total number of separate premises in the District upon which cows are kept is 561.

FIG. 1.—PLACE IN REAR OF BASEMENT, WITH ONLY ONE SMALL WINDOW, SHOWN AT REAR WHEEL OF WAGON.

FIG. 2.—SMALL REAR SHED.

UNDESIRABLE WASHINGTON MILK PLANTS.

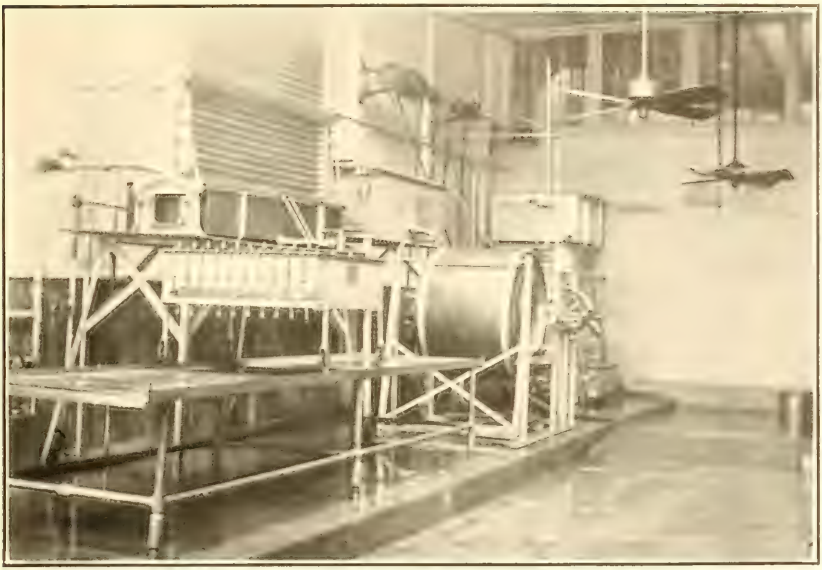

Fig. 1.—Interior of a Large, Clean, Well-Equipped Plant.

Fig. 2.—Cement Cooling Tank in Cold-Storage Room of Large Plant.

VIEWS IN HIGH-CLASS WASHINGTON MILK PLANTS.

more or less worn and decayed, musty, and moldy. Others are clean and thoroughly constructed, made of cement with metal edges (Pl. VIII, fig. 2). After the milk is cooled it is bottled and then put in cold storage until time for the morning delivery. Only a few years ago most of the milk was bottled by hand, even in some of the largest establishments, but more bottling machines are being introduced. During the summer some dealers prefer to hold the milk on ice in the receiving cans and bottle early in the morning just before delivery. Icing on delivery wagons is not common. Some of the milkmen have machinery for filtering and pasteurizing, and some have refrigerating outfits; many have boilers furnishing an abundance of hot water and steam for cleansing purposes. The tendency to pasteurization is on the increase, and six of the largest dealers now pasteurize most of their product.

DEALERS' AND PRODUCERS' ORGANIZATIONS.

The milk dealers of the District have an organization known as the "Dairymen's Association of the District of Columbia, Maryland, and Virginia." The producers, of whom there are about 1,000, also have an organization called "Milk Producers' Association of Maryland, Virginia, and the District of Columbia."

WHOLESALE AND RETAIL PRICES.

The price to the farmers is made for six-months periods, November 1 and May 1. The ordinary summer price some time ago was 12½ cents and 13 cents a gallon, and the winter price 17 to 18 cents. During the winter of 1906–7 as high as 20 cents was paid in some instances. The wholesale price for the summer of 1909 was 14 to 16 cents a gallon, and the producers' association fixed a price of 22 cents for the winter of 1909–10. More is paid for milk produced and handled under special sanitary conditions. The farmers pay the freight, furnish the cans, and sell the milk "delivered in Washington in good condition." In dealings between the producer and the dealer there are as a rule no written contracts, only oral agreements. In most cases the trade is for a stated amount daily.

The retail price ranges from 7 to 10 cents a quart, according to quality. Ordinary milk sells at 8 cents in summer and 9 cents in winter.

LAWS AND INSPECTION.

A milk law enacted by Congress for the District of Columbia became effective in March, 1895, and milk inspection in the District dates from that year.

Concerning this law Dr. William C. Woodward, the health officer, says:[1]

> Experience soon revealed defects, and efforts were promptly made to correct them. * * * The result has, however, not been encouraging. Bills introduced on recommendation of the health officer and receiving the indorsement of the Commissioners and of the Medical Society of the District of Columbia have been uniformly opposed by milk interests. The fight to obtain better legislation to regulate the sale of milk has always been carried to the committee room at the Capitol, and the fight has always been lost.

In spite of its defects, the law has proved very helpful in raising the quality of the District milk supply and reducing infant mortality.

The health department had no milk bacteriologist until 1910 and up to that time had made no bacteriological inspections of milk, while many cities had had a bacteriological laboratory for several years and considered a bacteriologist fully as important as a chemist in the inspection of milk. The appropriation act approved May, 1910, provided $500 for the equipment and maintenance of such a laboratory and authorized the bacteriologist who had been employed for contagious diseases service to undertake the bacteriological examination of milk and the water supply of dairy farms.

The law of 1895 contains many provisions ordinarily found in such laws. A system of licenses or permits is provided for. A producer who retails his own product is required to have two permits, one as a dealer and one as a producer. If he lives outside of the District his producer's permit is known as an "importer's" permit. The dealer's permit is known as a "dairy" permit. The law contains the unusual provision that grocers, bakers, and others selling milk shall post the names of dairymen from whom the milk is obtained, but does not require them to have a license. A person applying for a license can commence business at once pending the issuing of the license.

A general food law for the District of Columbia, passed a few years after the milk-inspection law, establishes a milk standard of 3½ per cent of fat, 9 per cent of solids not fat, and 12½ per cent of total solids.

The standard for cream is 20 per cent fat, 18 per cent being the enforceable figure. This quality is usually called table cream. Double cream has 40 per cent fat. Not much of the latter is sold, although considerable of the shipments from a distance have 40 per cent fat to save freight and on arrival it is reduced with milk to standard or 20 per cent cream.

By an order issued November 5, 1910, relative to applications for new permits if all cattle on the dairy farm to which any such applica-

[1] "The municipal regulation of the milk supply of the District of Columbia," in Bulletin 56 of the Hygienic Laboratory, Public Health and Marine-Hospital Service, p. 747, 1909.

tion relates are not free from tuberculosis as shown by the tuberculin test the application will be rejected.

The enforcement of the dairy laws is placed in the control of the District health department, but no provision is made for a distinctive milk division with a chief responsible for the milk and dairy inspection. In the roll of officers and employees of the health department there is no indication of anyone giving his exclusive attention to milk work. The department has 17 "sanitary and food inspectors," and one of these gives most of his time to inspecting city milk plants, while another is assigned to collecting samples. There are five veterinarians acting as inspectors who give most of their time to farm inspection, although they have to do also with rabies, glanders, and abattoir inspection. They are also permitted to engage in private practice on account of their small salaries, hence their undivided energies can not be given to dairy work. The producing territory is divided into districts having from 123 to 205 milk-producing farms in each, according to their location, and a veterinary inspector has charge of each district. The general supervision of the country work is intrusted to the chief clerk in the health office, and that of the city work to the chief inspector. The general chemist of the health office makes all of the milk analyses.

The national pure-food law gives the United States Department of Agriculture authority to enforce it in the District of Columbia, in the Territories, and in interstate and foreign commerce. The District health officer and his assistants have therefore been appointed collaborating officials of the Department of Agriculture, to collect samples, conduct hearings, and bring cases to the attention of the district attorney. The pure-food law also requires that analyses shall be made under the general direction of the Bureau of Chemistry. Consequently one of the chemists in the office of the District health officer has been appointed a collaborating chemist of the Bureau of Chemistry.

The District health department has done commendable work in milk inspection with inadequate powers and means and under adverse conditions. The health officer himself has frequently called attention to the weaknesses of the situation. In his report for 1907 he said:

> The work that the service has accomplished has been well done, but it could have been more intelligently and better done if provision had been made whereby some one person in the department could be, by the health officer, held responsible for the proper conduct of the service.

The expense of milk inspection in the District can only be approximated. Salaries aggregating $10,900 are paid to inspectors who give most of their time to milk work, and it is estimated that a proper pro rata of other salaries and expenses chargeable to the milk service is $4,900, making the total expense of milk inspection $15,800.

Congress has given the health department power to make regulations relative to water supply, drainage, ventilation, air space, floor space, and cleaning of milk plants and dairies within the District. Besides this, Congress requires that persons who bring or send milk into the District shall have a permit, which the health officer is given power to withhold or revoke for cause. He has therefore a lever with which he can do much in improving the methods of milk production.

A most remarkable fall in the death rate among infants from diarrheal diseases began with the establishment of milk inspection in 1895 and has progressed as the efficiency of that service has been increased.

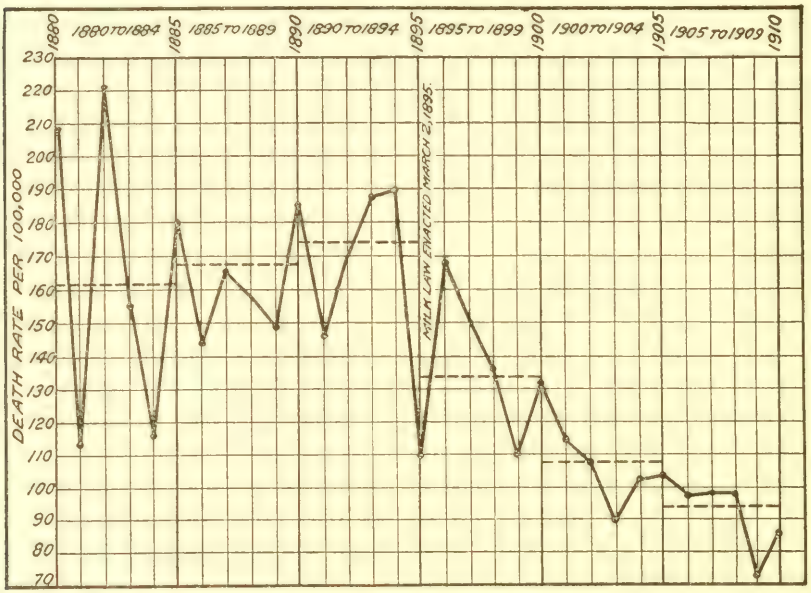

FIG. 6.—Chart showing decrease in death rate from diarrhea and enteritis in children under 2 years of age in the District of Columbia, following enactment of milk law of 1895. Dotted lines show averages for five-year periods.

This decrease in mortality is graphically shown in figure 6, which is reproduced from Dr. Woodward's paper in Hygienic Laboratory Bulletin 56 and is brought down to 1910 with information furnished by the District health department.

The improvement in the chemical quality of milk samples collected about the city is shown by the following table, which gives the percentage of samples below the standard during a period of four years:

	Per cent.
1903–4	27.50
1904–5	20.32
1905–6	12.37
1906–7	10.95
1907–8	16.41

During the fiscal year 1906–7, 883 farms were inspected, on an average, 4.4 times each; 4,960 samples of milk and cream were taken and analyzed; 77 milk plants were inspected an average of 22.8 times; 289 cases were prosecuted; and 139 requests for producers' permits were refused. During the year 1908–9 there were 4,294 inspections of farms upon which were 16,116 cows; 6,659 samples of milk and 101 samples of cream were collected and 135 cases were prosecuted, of which 130 resulted in convictions. Of the samples analyzed, 412 of milk and 45 of cream were found to be adulterated, and 243 of milk were below the standard (3.5 per cent) in fat.

A MILK-STANDARD DECISION.

As there is considerable agitation over the milk standard in various places, a decision of the Court of Appeals of the District of Columbia, rendered November 5, 1903, is of interest. The defense offered to show that 3.5 per cent of fat, "the standard prescribed, was unreasonably high and could not by ordinary care be maintained through all seasons of the year." The trial court refused to admit this evidence. The court of appeals sustained this ruling, saying:

> If the proposition of the defendant were sustained, the question of the reasonableness of the statute would be one of fact for the jury, and we should likely have different juries determining the question in different ways.

The court also said:

> To declare an act of Congress unreasonable and oppressive, and therefore void, is a power that the courts can not exercise except when the provision of the statute is shown to be plainly violative of some provision of the Constitution. The subject matter of the act of 1898 [a statutory milk standard] is plainly within the power of Congress, and the courts can not amend or modify any of the provisions of that act so as to bring them within what may seem to be reasonable bounds. They can not examine a question as expedient or inexpedient, as politic or impolitic.

The court also held that in case of food laws the question of intent is not involved; the party making a sale is bound at his peril to know what he is selling.

FEDERAL COOPERATION.

The milk supply of the District receives considerable attention from the Federal Government, and Federal officers are of material assistance to the District authorities. The Public Health and Marine-Hospital Service made an exhaustive study during the summer of 1906 of the prevalence of typhoid fever. (See Hygienic Laboratory Bulletin 34.) Bulletin 56, "Milk and its Relation to Public Health," from the same laboratory also contains the result of much investigation into local conditions.

The Bureau of Animal Industry of the Department of Agriculture has also been greatly interested in the District milk supply and has issued Circulars 111, 114, and 153 relating to the local conditions.

Since 1907 the bureau has gratuitously tested with tuberculin cows supplying the District with milk, the tests being made upon request of the owners of the herds. Out of 4,200 tests (including 1,729 retests) 12.93 per cent of the cows proved tuberculous. Of the animals tested for the first time 15.25 per cent reacted, and 9.16 per cent of those retested reacted. These tests include many herds in Maryland and Virginia.

In the latter part of November, 1909, the bureau began the systematic testing of all cattle in the District of Columbia under a cooperative arrangement with the District Commissioners and in accordance with an order of the commissioners, approved by the Secretary of Agriculture, issued November 26, 1909, for the suppression and prevention of tuberculosis in cattle within the District of Columbia. Under this order the tuberculin testing of all cows within the District has now been accomplished, the reactors have been slaughtered, the owners indemnified for the loss of tuberculous animals, and the premises disinfected. The number of cattle tested was 1,701, of which 321, or 18.87 per cent, reacted and were slaughtered, lesions of tuberculosis being found on post-mortem examination in all but 5 of the carcasses.[1] Cattle are being retested after the lapse of six months in order to detect any cases of tuberculosis that may have developed since previous tests. All dairy cattle brought into the District must be shown by the tuberculin test to be free from tuberculosis.

Material assistance has also been rendered by the bureau in investigating a recent outbreak of typhoid fever. The Dairy Division of the bureau has examined and scored every dairy farm contributing to the District supply and every dealer's establishment in the District and has cooperated with the District inspectors in the use of the score card.

[1] A report of this work is made by Dr. R. W. Hickman, chief of the Quarantine Division of the Bureau of Animal Industry, in a paper in the Yearbook of the United States Department of Agriculture for 1910.

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